

NORTH CAROLINA  
OCCUPATIONAL SAFETY AND HEALTH EDUCATION AND RESEARCH CENTER

SUMMARY ANNUAL REPORT  
July 1, 2008 – June 30, 2009

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SUBMITTED BY:  
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## **North Carolina Occupational Safety and Health Education and Research Center**

The purpose of the North Carolina Occupational Safety and Health Education and Research Center (NC OSHERC) is to train practitioners and researchers in the academic disciplines of Industrial Hygiene (IH), Occupational and Environmental Medicine (OEM), Occupational Health Nursing (OHN), Occupational Safety and Ergonomics (OS&E), and Occupational Epidemiology (OE). The program also provides continuing education for professionals in these areas who seek to maintain and update their skills. Program trainees will be well equipped to achieve the occupational safety and health objectives outlined in Healthy People 2010 and continue to develop skills as addressed in the IOM report: Safe Work in the 21<sup>st</sup> Century. The NC OSHERC is administered by an Executive Committee consisting of Center Director (Bonnie Rogers, DrPH, COHN-S, LNCC, FAAN) who also serves as the Program Director for OHN; Deputy Director (Judy Ostendorf, MPH, COHN-S, CCM, FAAOHN); Leena Nylander-French, PhD, IH Program Director; Dennis Darcey, MD, MSPH, FACOEM, OEM Program Director; David Kaber, PhD, OS&E Program Director; David Richardson, PhD, OE Program Director; and Kathleen Buckheit, MPH, Director of Continuing Education and Outreach and Hazardous Substance Training Programs. All programs are located at the University of North Carolina, Chapel Hill, except OEMR which is at Duke University and OS&E which is at North Carolina State University.

This report focuses on major accomplishments/highlights in program areas, including the impact of ERC programs within the applicable DHHS Region IV. The period covered by this report is 7/1/08-6/30/09. During this period, the following major accomplishments have been achieved.

### **Major Accomplishments**

Outreach efforts have been outstanding by all faculty with enormous amounts of participation with community and fostering translation of research to practice via numerous publications, collaborative sponsorships of courses, presentations, and consultations. Our NORA Interdisciplinary Seminar Series is presented on campus and webcast so that all NIOSH funded students can attend these required seminars along with outreach to the larger occupational safety and health community. The April 2009 seminar on Occupational Mental Health: Recognizing the Signs of Stressed Employees had an attendance high of 242. All disciplines have been represented. In addition to the U.S. and countries previously listed, the following countries participated for the first time during this time period; Ireland, Mexico, Philippines, Spain, and the United Arab Emirates. The NORA Interdisciplinary Seminar Series has continued to discuss research pertinent to NORA.

A NC OSHERC Newsletter (News-E) was developed and distributed to more than 20,000 members of the occupational safety and health community. It included information about each ERC program area and pertinent information about occupational safety and health.

Eleven Pilot Project applications were received. Two were awarded: “Determination of Penetration Pattern of HDI Monomer and its Oligamers in Human Skin” (Jennifer Thomassen working with Dr. Leena Nylander-French) and “Investigation of Ergonomic Interventions for Scaffold Uses in Nuclear Power Facility Maintenance Tasks” (Matt Diering working with Dr. David Kaber).

### **Industrial Hygiene Program - Director: Leena Nylander-French, PhD**

The industrial hygiene faculty is comprised of six full-time and ten adjunct faculty members and identifies itself as the Exposure Assessment and Control (EAC) focus group, which includes industrial hygiene, exposure assessment, and air pollution control. EAC faculty has been actively collaborating in joint research projects and educating and training our Master’s and doctoral students. The EAC faculty advised 7 MS and 19 doctoral students of whom 3 are minority students. The Industrial Hygiene Program supported 3 doctoral students during fall 2008 and 1 Master’s and 3 doctoral students during spring 2009. One minority doctoral student is supported with NIOSH-ERC funding. Our joint research project with the Safety & Health Assessment & Research for Prevention Program of the Washington State Department of Labor and Industry to investigate diisocyanate exposures in automotive refinishing industry (supported by NIOSH R01-OH007598) has generated new and important knowledge on dermal and inhalation exposure levels as well as urine and blood biomarker data related to external exposure levels. Two of the NIOSH IH trainees presented their research findings in both national and international scientific meetings.

Research findings from this project have resulted in six published manuscripts and two have been submitted for publication, to date. The data pertaining to inhalation exposure levels and means to provide additional protection for the workers has been provided to each of the automotive spray-painting facilities involved in this study. This research has also generated additional collaboration with the University of Washington to investigate the effectiveness of protective clothing to prevent diisocyanate exposure (NIOSH R01-OH009364). Further, one NIOSH IH trainee was successful in obtaining a pilot grant to investigate dermal penetration patterns of diisocyanates in human skin.

### **Occupational and Environmental Medicine - Program Director: Dennis Darcey, MD, MSPH, FACOEM**

The Duke Occupational and Environmental Medicine Residency Program (OEMR) continues to have a regional impact in DHHS Region IV by training occupational medicine physicians, providing extensive occupational health

education opportunities for practicing occupational health and safety professionals and conducting research relevant to preventing hazardous occupational and environmental exposures and disease.

The Duke program currently has two NIOSH funded residents, Qilin Song, MD, MPH and Diane Ballerino-Regan, MD, MPH. Both residents have completed prior training in Preventive Medicine. The program graduated two residents this past year both of whom want to permanently locate in Region IV. John Longphre, MD, MPH, is now the Associate Medical Director of WorkCare, an occupational health consulting firm based in Greensboro, NC. Anand Joshi, MD, MPH is continuing training at the University of Pennsylvania's Spine Center and plans to return to a faculty position at Duke in 2010.

Duke Occupational Medicine Continuing Education Programs provided by faculty over the last year included the training of 2,333 occupational health professionals from medicine, nursing, safety, and industrial hygiene employed in industry, government, and academia. The Annual Carolinas Occupational Medicine Conference sponsored by the NC OSHERC was attended by practicing occupational medicine physicians throughout North and South Carolina and Virginia. The Program Director Dennis Darcey, MD, MSPH, completed a web based continuing medical education program regarding the potential health hazards of environmental exposure to toluene diisocyanate that is available to all practicing physicians, nurses and occupational health professionals throughout Region IV. This is part of a joint project with ATSDR and the NC State Health Department who are conducting a research study examining exposure and health effects associated with toluene diisocyanate release from industrial facilities in North Carolina. Hester Lipscomb, PhD, RN continues research to practice projects funded by the Center to Protect Workers Rights in a NIOSH cooperative agreement: 1) prevention of nail gun injuries in residential carpenters; 2) prevention of patient handling injuries, evaluation of minimal manual lift policy supported with lift equipment.

#### **Occupational Health Nursing Program - Program Director: Bonnie Rogers, DrPH, COHN-S, LNCC, FAAN**

The Occupational Health Nursing (OHN) Program has been part of the NC OSHERC for more than 30 years. The goal of the Program is to provide education, training, and research experiences as appropriate to occupational health nursing professionals, so as to transfer learned knowledge to protect and promote the health of the workforce. During this reporting period 4 trainees were admitted and 3 trainees graduated.

Trainees and graduates received awards at the AAOHN Symposium in Orlando, FL and the UNC School of Public Awards Day. Two program graduates published 6 articles in professional publications. Current students published 2 continuing education articles in the AAOHN Journal during this reporting period. Dr. Bonnie Rogers was elected as Vice-President of the International Commission on Occupational Health (ICOH) and Ms. Susan Randolph was appointed Secretary, Scientific Committee on Occupational Health Nursing (SCOHN) of the ICOH. The OHN Program continues to actively participate in the NC OSHERC continuing education/outreach efforts, which focus on DHHS Region IV. Offered are the "OHN Certification Review" and the "Occupational Health Nursing: Introduction to Principles and Practice" courses each year.

#### **Occupational Safety and Ergonomics Program - Program Director: David B. Kaber, PhD**

The major accomplishments for the Occupational Safety & Ergonomics (OSE) component this reporting period have included a pilot research project through the NC OSHERC, student publications and graduations, and recruiting new masters and PhD students. In Spring 2009, Matt Diering (NIOSH Trainee) received funding for a pilot research project to investigate the effectiveness of various ergonomic interventions in scaffolding operations for maintenance tasks at nuclear power facilities. This work involved novel design and selection of scaffold equipment for a utility company and a field study with actual scaffold operators to measure physiological responses (goniometer and EMG data). Lashanda Lee published a paper with co-authors on nursing robot interface design for patient emotions through the *IEEE Conference on Automation Science and Engineering*. Meghan Garner and Lashanda Lee both published papers through the *International Ergonomics Association Meeting* on the effects of driver age and stress disposition on situation awareness under hazardous conditions, and service robot interface design for anthropomorphism, respectively. Meghan Garner completed her masters degree in December, 2008 and Theo Veil finished his masters in May, 2009. New students, who have joined the training program, include Michael Clamann, studying at the PhD level, and Meghan Rogers, Kinley Taylor and Chad Uy working towards masters degrees. This is the largest group of new trainees that we have recruited to the OSE component since the inception of the funding.

The major impacts our program area has had on the region have occurred through collaborative research with The Ergonomics Center of North Carolina (ECNC). Two of the NIOSH trainees, Matt Diering and Theo Veil, continued to participate in ergonomics program implementation for Duke Energy (DE), specifically the Nuclear Department. Matt worked with several other program students to design an experiment to test the effects of alternate scaffold plank tie-down materials as well as a new scaffold tube couplers on operator performance. Theo worked with Matt on rapid prototyping a new tube coupler in the NC State Manufacturing Labs. ECNC staff worked with the students to execute the scaffolding

field experiment. Environmental Safety & Health staff at DE submitted documentation of this work for a corporate safety progress award. Beyond applied research, our program has had an impact through the Engineering On-line (distance education) Program at NC State (<http://engineeringonline.ncsu.edu/>). In Spring 2009, we offered "Human Factors & Systems Design" (ISE 540) on video. Eleven off-campus students enrolled in the course, including industry professionals from North and South Carolina. We have previously offered Occupational Biomechanics (ISE 544), Occupational Safety Engineering (ISE 541), and Bayesian Decision Analysis (ISE 712) through the on-line program. Finally, NC State OSE faculty and staff have offered courses through the Continuing Education component of the NC OSHERC, including Nelson Couch's instruction of laboratory safety, Tim McGlothlin's instruction of ergonomics in the workplace and for production facilities, and David Kaber's offering of human factors in systems design.

#### **Occupational Epidemiology - Program Director: David Richardson, PhD**

Occupational Epidemiology is an allied research training program that has been part of the NC OSHERC since 2001. Dr. David Richardson serves as program director, with 7 core faculty and 10 adjunct faculty supporting the training program in epidemiology. Trainees are engaged in high-quality research on occupational health and safety.

Trainee Steve Lippman presented his master's paper "Taxi Driving Exposure and Prevalence of Elevated Liver Enzymes and Suspected Non-Alcoholic Fatty Liver Disease" in April 2009 and was promoted into the doctoral program in Epidemiology in May, 2009. Ghassan Hamra has been promoted into the doctoral program and is working on development of a dissertation project which will focus on risk assessments for tritium exposures accrued by employees at the Savannah River Site (SRS) nuclear facility. Program director, Dr. David Richardson, was promoted to rank of Associate Professor in January, 2009, became Associate Editor of the journal *Occupational & Environmental Medicine* in January, 2009, served as a visiting research fellow at the Radiation Research Foundation in Hiroshima, Japan in June-July, 2008, and served as Chair, Subgroup on Radiation Epidemiology, for the International Agency for Research on Cancer's Monographs Program (Volume 100D) in 2008-2009.

#### **Continuing Education Program - Program Director: Kathleen Buckheit, MPH, COHN-S/CM/SM**

Since 1976, the Continuing Education (CE) Program has provided quality opportunities for occupational safety and health professionals. A substantial need for this service is evident, based on needs assessments, outreach, recruitment, activities, and course evaluations. CE Program objectives are used as measures of success and are being met. Course evaluations serve as quality assurance and confirm that courses are effectively and efficiently delivering the CE programs and services. Faculty participation includes both academic and non-academic faculty, who are experienced practitioners and consultants and represent all occupational health and safety disciplines, offering a unique blend of theoretical and practical experience. All faculty continue to engage in outreach with professional associations and participate as course directors, planners, presenters, evaluators, and technical advisors.

New courses are offered every year. Some were presented in partnership with the South Eastern Atlantic College of Occupational and Environmental Medicine (SEACOEM) Annual Symposium (formally COEMA) and two conferences in partnership with the NC Association of Occupational Health Nurses (NCAOHN). This year's economy caused the cancellation of the Annual Regional ERC Symposium with the Sunshine and Deep South ERCs, which has been developed to increase regional focus, breadth of topics, and collaboration with other ERCs. Other collaborations with the Region IV ERCs will occur in January 2010. New *Short Safety Courses*, consisting of five topic sections of 3-5 courses per section were developed to be offered this fall in Chapel Hill and also as contract courses.

Trainee recruitment, including diversity efforts, meets the training needs of the region. The geographic statistics indicated that **85%** of the trainees were from the southeast region. For 2008-2009, the diversity breakdown of attendees reporting their ethnic background was: White - 69%; Black - 21%; Hispanic - 8%; Asian - 1%; American Indian - 1%. Courses are interdisciplinary and listed on Tables 12a requested by NIOSH. The CE Program (without HST) trained **5,612 students in 108 courses, an increase of 14%**, despite the economic issues that reduced our income by 45%. Because of travel restrictions of companies, we were forced to cancel courses or offer tuition waivers.

#### **Hazardous Substance Training - Program Director: Kathleen Buckheit, MPH, COHN-S/CM/SM**

The NC OSHERC Hazardous Substance Training (HST) Program has been growing and expanding throughout the region. Several new areas of Kentucky and Tennessee have been the focus of training.

The geographic statistics indicated that 90% of the trainees were from the southeast region. For 2008-2009, the diversity breakdown of attendees reporting their ethnic background was: White - 70%; Black - 20%; Hispanic - 10%. HST courses are interdisciplinary and listed on Tables 12a requested by NIOSH. The HST Program trained **666 students in 31 courses**, despite the economic issues that reduced our income by 55%. Because of travel restrictions of companies, we were forced to cancel courses or offer tuition waivers. Over \$10,000 from the NIOSH HST grant funding was used to support training of state and local government workers.

New and exciting opportunities are being developed in NC OSHERC. Partnerships are increasing with Local Emergency Planning Committees and Hazardous Materials and Firefighter responders. NC OSHERC is working on a Needs Assessment Program with the NC Department of Environment and Natural Resources (DENR). A new Telecom HAZMAT Specialist Certificate Program is being developed for those responders who also need a specialized skillset in reconnecting the lines of communications within a disaster area and will be offered this fall.